

PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON.

PLANTS OF THE PRIBILOF ISLANDS, BERING SEA.*

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WITH CRITICAL NOTES BY J. N. ROSE.

INTRODUCTORY NOTE.

The present incomplete list of the plants of the Pribilof or Seal Islands is based on specimens collected by me from July 28 to August 10, 1891, and presented to the National Herbarium in the United States Department of Agriculture. The collection consists of about 1,000 specimens in good condition, comprising upwards of 130 species. Several collections of plants have been made on the islands before, but owing to the constant fogs were ruined by dampness and mould before reaching Washington. My plants were dried by artificial heat and kept in a dry place on the United States Fish Commission Steamer 'Albatross' until their arrival at Puget Sound, whence they were transmitted promptly to Washington by rail.

So far as I am aware, no previous list of the plants of these islands has appeared, though the Pribilof Islands are mentioned as a locality under a number of species in 'Flora Rossica,' and Townsend enumerates 12 species that were brought back by him and identified by Dr. George Vasey.† The present list cannot

* Read before the Biological Society of Washington, May 28, 1892.

† Cruise of the *Corwin* for 1885, 1887, p. 97.

be anything like complete, since I was on the islands altogether only two weeks and botanizing was incidental to more urgent duties; moreover, only limited parts of the islands were traversed, and the date (end of July and early August) was so late that many plants were past flowering. On several rambles I had the good fortune to be accompanied by Mr. James M. Macoun, of the Geological and Natural History Survey of Canada, who will doubtless supplement my list by many additional records, particularly from St. George Island, where my opportunities for collecting were reduced to a minimum. No collecting was done on Walrus or Otter Islands.

ACKNOWLEDGMENTS FOR THE DETERMINATION OF SPECIES.

The majority of the flowering plants were identified by me on the islands. The entire collection on its arrival in Washington was examined by Dr. George Vasey, Botanist of the United States Department of Agriculture, and was turned over by him to Mr. J. N. Rose, Assistant Botanist, for critical study. Mr. Rose has gone over the collection, verifying and supplementing my determinations, and has contributed critical notes on four species, which are inserted in brackets over his initials. Special groups have been submitted to specialists for determination as follows: The *willows* have been identified by Dr. M. S. Bebb; the *grasses* by Dr. George Vasey; the *Carices* by Prof. L. H. Bailey; the *Juncaceæ* by Mr. F. V. Coville; the *mosses* except the *Sphagnums* by Mrs. E. G. Britton, Mr. John M. Holzinger, and Dr. V. F. Brotherus, of Helsingfors, Finland; the *Sphagnums* by Dr. C. Warnstorff, of Neuruppin, Germany; and the *Hepaticæ* by Prof. L. M. Underwood. Six species of mosses collected on St. Paul Island by Mr. Macoun during our visit have been described as new by Dr. H. C. Kindberg.*

BRIEF DESCRIPTION OF THE PRIBILOF ISLANDS WITH SPECIAL REFERENCE TO THEIR VEGETATION.

The Pribilof group in Bering Sea is about 350 kilometers (220 miles) north of the Aleutian Chain, and comprises the islands St. Paul and St. George, separated by about 64½ kilometers (40 miles) of sea, and two islets known as Walrus and Otter Islands,

* Ottawa Naturalist, vol. v, p. 179; separates issued January 12, 1892.

near St. Paul. St. Paul is the largest, measuring about $23\frac{1}{2}$ kilometers (14 miles) in length by 12 kilometers ($7\frac{1}{2}$ miles) in greatest breadth; St. George is a little less than 19.3 kilometers (12 miles) in length by a little more than 8 kilometers (5 miles) in greatest breadth. The highest land is on St. George, where a precipitous cliff fronting the sea and a hill in the interior exceed 275 meters (900 feet). The highest land on St. Paul is a little over 183 meters (600 feet). The group is of volcanic origin, and the general surface is rolling, with precipitous cliffs along the water front in many places, alternating with broad valleys and basins. The cliffs predominate on St. George. In summer the islands are almost constantly enveloped in fog; the atmosphere is saturated (the wet and dry bulbs registering the same), and the temperature is uniformly low, the thermometer ranging from 7° C. (= 45° F.) to 9° C. (= 48° F.) or rarely 10° C. (= 50° F.). A good many snow-banks were conspicuous on St. George at the time of our visit, and a few remained in sheltered places on St. Paul. Level moss-bogs and small fresh-water ponds abound, but the greater part of each island consists of extensive stretches of sloping or hilly land thickly strewn with volcanic rocks $\frac{1}{2}$ meter to 2 meters ($1\frac{1}{2}$ to 6 feet) in diameter, with innumerable pit-holes between them.

On nearing the islands, if the fog lifts a little, the visitor is impressed by the luxuriance and intensity of color of the deep-green or yellowish-green vegetation which completely covers the surface, as in the case of the less precipitous slopes of the Aleutian Chain. This vegetation consists chiefly of rank grass and bog-moss, interspersed with multitudes of beautiful and showy flowers, which are numerous enough to give color to large areas. There is not a tree or bush on either island, and the highest woody plant—a dwarf willow (*Salix reticulata*)—hardly reaches the height of 75 mm. (3 inches) above the moss-bed in which it grows. Many of the side hills and flats are buried waist deep in a dense growth of rank rye grass (*Elymus mollis*) and cow parsnip (*Heracleum lanatum*), called 'poochka' by the native Aleuts. A coarse but pleasing lupine (*Lupinus nootkatensis*), averaging nearly 1 meter (3 feet) in height and very bushy, is abundant in most parts of the islands, often growing in company with the handsome monkshood (*Aconitum delphinifolium*), which, together with the beds of *Polemonium cærul-*

leum, cover nearly half the green carpet with blue and purple blossoms. Interspersed among the blue flowers just mentioned, and frequently forming large patches by itself, is the pink or pinkish-purple *Pedicularis langsдорffii*. Then there are acres of the showy Alaska poppy (*Papaver nudicaule*), the individual plants standing near enough together to give a delicate yellow glow to the areas they cover. In places the moss and heather bogs are blue from the abundance of blue bells (*Campanula lasiocarpa*), whose disproportionately large flowers actually recline on the moss through which their short stems rise, while another species of the same genus (*C. pilosa*) is inconspicuous and easily overlooked. Other bogs are covered with the deep yellow flowers of *Geum rossii*. A blue violet (*Viola langsдорffii*), a blue and white gentian (*Gentiana frigida*), a spring beauty (*Claytonia arctica*), the Alaska oxeye (*Chrysanthemum arcticum*), a dwarf cornel (*Cornus unalascensis*), and the pretty white star-flower (*Trientalis arctica*) are common in places on the moss-bogs, and sometimes grow in the grass also. Beds of *Omphalodes nana chamissonis* and *Silene acaulis* are common in spots, especially about Bogoslof hill and Polavina, but were mostly past flowering at the time of my visit. Several species of saxifrage are common, the most conspicuous being *S. hirculus*, whose rich, deep-yellow blossoms are much admired.

The raspberries are represented by two dwarf species, *Rubus stellatus* and *R. chamæmorus*; the former was in full bloom and the latter in fruit. The beautiful sea vetch (*Lathyrus maritimus*) abounds in a few spots, but is not generally distributed, and the showy lungwort (*Mertensia maritima*) is common at Northeast Point on St. Paul, and was found sparingly in a few other places, always along the shore. *Primula nivalis* is common in a depression at the mouth of a large cave on Bogoslof hill, but was not found elsewhere on St. Paul.

Ferns are rather scarce, though several species occur. The prevailing moss of the moss-bogs is *Racomitrium lanuginosum*. *Sphagnum* is scarce on St. Paul, but common on the low bogs of St. George. Heather (*Empetrum nigrum*) abounds on both islands, forming extensive beds—sometimes pure, but usually mixed with moss. Its black umbilicated berries were ripening early in August. Two species of *Lycopodium* occur, but are not common.

LIST OF PLANTS COLLECTED ON THE PRIBILOF ISLANDS
IN JULY AND AUGUST, 1891.*

Anemone richardsoni Hooker.

Flowering specimens collected on St. Paul August 7. Not common.

Ranunculus flammula reptans Meyer.

Common about the edges of fresh-water ponds on St. George. Collected in flower August 10.

Ranunculus eschscholtzii Schlecht.

Found in flower among rocks near Bogoslof hill, St. Paul, August 7.

Ranunculus hyperboreus Rottb.

Found in flower on both St. Paul and St. George.

Aconitum delphinifolium Reich.

Abundant on both islands; in full bloom during the latter part of July and early August. Those growing in the moss-bogs are smaller and more delicate than those on higher and drier ground.

Papaver nudicaule Linn.

Abundant on both islands; sometimes scattered here and there in the grass among other equally conspicuous flowers, but often growing in large beds on the moss and heather bogs, covering acres with handsome yellow flowers, which are of large size; at height of blooming the last week of July; petals falling early in August.

Cardamine hirsuta Linn.

Abundant on both islands.

* Respecting the localities assigned, it should be borne in mind that most of the collecting was done on St. Paul Island; hence a large number of the species here attributed to St. Paul alone doubtless occur in equal abundance on St. George.

Draba incana Linn.

Tolerably common on St. Paul.

Cochlearia officinalis Linn.

Common on St. Paul; in full flower.

Cerastium alpinum Linn.

Common on both islands; in full flower.

Cerastium arvense Linn.

Collected on St. Paul Island by Townsend in 1885 and identified by Dr. Vasey.

Viola laugsdorffii Fischer.

Common on both islands; at height of flowering about the end of July.

Silene acaulis Linn.

Common in small patches, particularly on rocky hillsides; past prime.

Lychnis apetala Linn.

Common on St. Paul.

Stellaria crassifolia Ehrh.

Collected on St. George August 10.

Stellaria humifusa Rottb.

Rather common on St. Paul.

Stellaria media Smith.

Common on St. Paul.

Arenaria macrocarpa Pursh.

Abundant on the heather and moss bogs on both islands. Flowers large, white.

Arenaria peploides oblongifolia Watson.

Common in moss bogs near Polavina on St. Paul.

Sagina linnæi Presl.

Common on both islands.

Claytonia arctica Adams.

Common on St. Paul; in full bloom the end of July.

Montia fontana Linn.

Tolerably common on St. Paul.

Lupinus nootkatensis Donn.

Very abundant and conspicuous on both islands; grows high and rank; flowers past prime before end of July.

Lathyrus maritimus Bigel.

Common in a few places on St. Paul; in full flower July 30.

Rubus chamæmorus Linn.

Abundant on both islands, particularly on the heather bogs. Fruit full grown but imperfect and not ripe the latter part of July.

Rubus stellatus Smith.

Common on the heather bogs of both islands. In full bloom the latter part of July; flowers deep, rich red.

Geum rossii Seringe.

Abundant on both islands and growing in the moss bogs in patches a meter or two in diameter. A little past prime in early August. The deep yellow flowers are showy and handsome.

Potentilla fragiformis Willd.

Common on St. Paul; past prime.

Potentilla palustris Scop.

Common in some of the sphagnum bogs on St. George; in flower the first week in August.

Saxifraga bracteata Don.

Common on St. Paul.

Saxifraga chrysantha Gray.

Common in places near Bogoslof hill on St. Paul. Its rich yellow flowers are conspicuous, though considerably smaller than those of *S. hirculus*.

Saxifraga hieracifolia Waldst. & Kit.

Common in places on St. Paul.

Saxifraga hirculus Linn.

Common in patches in the Polavina moss-bogs. Flowers large, yellow, and handsome.

Saxifraga stellaris comosa Willd.

Collected on St. George August 10.

Saxifraga unalaskensis Sternb.

Collected on Polavina moss bogs August 8.

Chrysosplenium ———.

Collected on Bogoslof hill, St. Paul Island, August 7, 1891.

[Acaulescent or with a single leaf, 1 to 3 inches [25–75 mm.] high, pubescent, purplish; radicle leaves on petioles nearly as long as the stems, pubescent; blade oval, 3 to 5 lines [6–10 mm.] broad, 4- to 5-crenate, nearly glabrous; involucral leaves several, shortly petioled, entire or 3-crenate, longer than the flowers; calyx purple, 3 lines [6 mm.] broad, 4-lobed; stamens 8, half as long as sepals; disk prominent. St. Paul Island, Pribilof group. August 7, 1891. Collected by C. Hart Merriam. It seems nearest *C. alternifolium*. The variety *tetrandrum*, to which all our North American forms have been referred, has smaller greenish flowers, 4 stamens, and more leafy stems.—J. N. ROSE.]

Hippurus vulgaris Linn.

Tolerably common on St. George.

Epilobium anagallidifolium Lam.

Collected on St. George August 10.

[A peculiar form [100–125 mm.] 4 to 5 inches high, erect; peduncle 1½ to 2 inches long [38–50 mm.]; capsule single or in

pairs. Dr. Wm. Trelease thinks it must be "the more erect long-pedicelled form" of this species.—J. N. R.]

***Heracleum lanatum* Michx.**

Abundant on both islands; very large and rank, averaging more than a meter (3 feet) in height. In full flower early in August. This plant is called 'poochka' by the natives, who eat the stalks raw after peeling as we peel pie plant; it is not at all bad.

***Ligusticum scoticum* Linn.**

Rather common.

***Cœ'oplureum gmelini* Ledeb.**

Common and rank.

***Cornus unalaskensis* Ledeb.**

Not common or generally distributed. Tolerably common on the moss bogs at Polavina and near Bogoslof hill, on St. Paul, and in places on St. George. In full flower early in August.

***Valeriana capitata* Pallas.**

Tolerably common; past prime before the end of July.

***Valeriana sylvatica* Banks.**

Collected on St. Paul Island by Townsend and identified by Dr. Vasey.

***Achillea millefolium* Linn.**

Common on both islands.

***Aster sibiricus* Linn.**

Common on a moss bog on St. Paul, between the village and Polavina. In full flower early in August.

***Chrysanthemum arcticum* Linn.**

Common in places on both islands, usually in moss bogs; at height of flowering early in August.

Artemisia globularia Cham.

Common in places on St. Paul, particularly about Polavina. St. Paul is the type locality of this species.

[It has rarely been collected, and until now has been a desideratum in the National Herbarium.—J. N. R.]

Artemisia norvegica pacifica Gray.

Specimens determined by Mr. Rose as belonging to this subspecies were collected on both St. Paul and St. George, although the forms inhabiting the different islands are distinguishable.

[The type form of *A. norvegica*, or at least the Rocky Mountain plant which passes as such, is common upon St. Paul. Gray, in the Synoptical Flora, does not extend the range of the species so far north. The stems are [200–305 mm.] 8 to 12 inches high, nearly erect, and very villous (as are also the leaves) except near the base. On St. George occurs a nearly glabrate form, which answers to the var. *pacifica*.—J. N. R.]

Artemisia vulgaris tilesii Ledeb.

Collected near Bogoslof hill, on St. Paul, and near the village on St. George.

[On St. George Island occurs *A. vulgaris*, var. *tilesii*, but the heads are so much larger than *A. vulgaris* that I am inclined to the opinion that this form should have been kept distinct. The form from St. Paul Island, although similar, has somewhat smaller leaves, and these are white-lanate on both sides.—J. N. R.]

Petasites frigida Fries.

Tolerably common on St. Paul; past flowering by August 1.

Senecio pseudo-arnica Less.

Common on St. Paul; just coming into flower the first week in August.

Taraxacum officinale lividum Koch.

Not very common on St. Paul; in flower early in August.

Campanula lasiocarpa Cham.

Common in places on St. Paul, particularly in the drier moss plains; flowers large and handsome.

Campanula pilosa Pallas.

Not common and easily overlooked. Found only between the village and Polavina on St. Paul; in full flower in early August.

Armeria vulgaris Willd.

Common in beds on both islands; past prime.

Primula nivalis Pallas.

Common in a depression at the mouth of Bogoslof cave; not found elsewhere on St. Paul. Common in places on St. George. Nearly past flowering by the end of July.

Androsace chamæjasme Host.

Common on both islands, but nearly out of flower by the end of July.

Trientalis europæa arctica Ledeb.

Tolerably common, but scattering; in full flower the latter part of July.

Gentiana tenella Rottb.

Collected on St. Paul by Townsend and identified by Dr. Vasey.

Gentiana frigida Hænke.

Common and showy on some of the moss bogs near Bogoslof and Polavina on St. Paul; at height of bloom about August 10.

Gentiana glauca Pallas.

Mr. Macoun tells me he found this gentian on St. George.

Polemonium cæruleum Linn.

Abundant on both islands, flowering profusely, and often covering large areas; past prime by the first week in August.

Omphalodes nana chamissonis Herder.

Common in small patches on Bogoslof hill, St. Paul, but nearly out of flower by the first of August.

Mertensia maritima Don.

Common at Northeast Point and along some of the gravel beaches elsewhere on St. Paul. In full flower the latter part of July.

Pedicularis langsдорffii Fisch.

One of the most abundant and conspicuous plants on both islands. Grows in large patches and presents such a diversity of forms as to suggest several species. Flowers past prime by end of July.

Gymnandra gmelini Cham. & Schl.

Collected at the mouth of Bogoslof cave on St. Paul August 7, where it was common and past prime.

Oxyria reniformis Hooker.

Rather common in places, particularly about Bogoslof hill on St. Paul.

Polygonum viviparum Linn.

Abundant on both islands; past prime.

The willows have been determined by Mr. M. S. Bebb as follows:

Salix arctica Pallas.

Collected on Polavina moss bogs, St. Paul, August 8.

Salix phylicoides And.

Collected at Bogoslof hill, St. Paul, August 7.

Salix reticulata Linn.

Abundant on both islands, growing in dense mats on the bogs. Though the branches are long, they are prostrate and buried in the moss, so that the highest leaves rarely reach more than 70 or 80 mm. ($2\frac{3}{4}$ or 3 inches) above the general surface of the bog.

Salix [intermediate between *S. arctica* and *S. ovalifolia*—may possibly be a hybrid.—M. S. BEBB.]

Collected July 30 on St. Paul.

Empetrum nigrum Linn.

Abundant on both islands and forming the covering of large areas. It sometimes forms pure heather bogs, but more often is mixed with moss, usually *Racomitrium*.

Fritillaria kamtschaticensis Ker.

Common on St. George between Zapadnie and the highest part of the island; not seen on St. Paul.

The rushes (*Juncaceæ*) have been determined by Mr. F. V. Coville as follows:

Luzula arcuata unalaskensis Buchenau.

Collected on St. George Island.

Luzula confusa latifolia Buchenau.

Common on St. Paul.

Luzula campestris sudetica Celakovsky.

Common on St. Paul.

The sedges (*Cyperaceæ*) have been determined by Prof. L. H. Bailey as follows:

Carex alpina Swartz (form).

Collected on St. George Island August 10.

Carex cryptocarpa Meyer (form).

Common on Polavina, St. Paul.

Carex norvegica Schk.

Common with the last species.

Carex rigida bigelovii Tuckerman (= **C. hyperborea** Drejer).

Common on St. Paul.

The grasses have been determined by Dr. George Vasey as follows :

Phleum alpinum Linn.

Common on both islands.

Alopecurus alpinus Linn.

Collected on St. Paul Island.

Alopecurus macounii Vasey.

Collected on St. George Island.

Arctagrostis latifolia Griseb.

Collected on St. Paul Island.

Calamagrostis deschampsoides Trin.

Collected on St. Paul Island.

Deschampsia cæspitosa arctica Vasey.

Common on the old seal rookeries.

Arctophila fulva Rupr.

Collected on St. Paul Island.

Poa arctica R. Br.

Collected on St. Paul Island.

Glyceria angustata Fries.

Common on the abandoned parts of the seal rookeries.

Elymus mollis Trin.

Abundant and rank ; the tall grass of the islands.

Ferns are rather scarce on the Pribilof Islands. The specimens collected and brought back by me have been mislaid in the National Herbarium and cannot now be found. The same is true of the club-mosses. The following ferns were collected

on the Pribilof Islands by Mr. C. H. Townsend in 1885 and identified by Dr. George Vasey (see Cruise of the *Corwin* for 1885, 1887, p. 97):

Polypodium vulgare Linn.

Aspidium spinulosum Swartz.

Aspidium lonchitis Swartz.

The following species of *Lycopodium* was identified in the field:

Lycopodium selago Linn.

Found sparingly in a few places, particularly on St. George Island.

Mr. John M. Holzinger has kindly undertaken the determination of the mosses. In this he has been assisted by Mrs. E. G. Britton of New York, Dr. V. F. Brotherus of Helsingfors, Finland, and Dr. C. Warnstorff of Neuruppen, Germany. The latter is sole authority for the *Sphagnum*s, in the list of which, owing to the peculiarities of the nomenclature employed, the word 'forma' and the name following are inserted as given by Dr. Warnstorff in order to avoid the use of pure quadrinomials. The *Dicranum* was determined by Prof. C. R. Barnes of Madison, Wisconsin.

In the case of these *Sphagnum*s I fear a transposition of labels has taken place, since most of the specimens were collected on St. George Island and only one or two on St. Paul—the latter from Bogoslof hill.

Species and subspecies preceded by an asterisk (*) were collected by Mr. James M. Macoun on St. Paul Island in July and August, 1891, and described as new by Dr. N. C. Kindberg in the *Ottawa Naturalist*, vol. v, January 12, 1892, p. 179.

Bartramia ithyphylla Brid.

Collected on St. Paul Island.

Bryum arcticum Bruch.

Collected on St. Paul Island.

* **Bryum brachyneuron** Kindberg.

* **Bryum froudei** Kindberg.

Bryum pendulum Schimp.

Collected on St. Paul Island.

Bryum inclinatum Br. & Sch.

Collected on St. Paul Island.

Ceratodon purpureus Brid.

Collected on St. Paul Island.

* **Ceratodon heterophyllus** Kindberg.

Desmatodon systilius Br. & Sch.

Collected on St. Paul Island.

Dicranum elongatum Schleich.

Collected on St. Paul Island.

Hypnum (Calliergon) cordifolium Hedw.

Collected on St. Paul Island.

Hypnum (Pleurozium) splendens Hedw.

Collected on St. Paul Island.

Hypnum (Hylocomium) squarrosus Linn.

Collected on St. Paul Island.

Hypnum (Hylocomium) triquetrum Linn.

Collected on St. Paul Island.

Hypnum (Brachythecium) rivulare Bruch.

Collected on St. Paul Island.

Mnium subglobosum Br. & Sch.

Collected on St. Paul Island.

Oncophorus wahlenbergii Brid.

Collected on St. George Island.

Orthotrichum lævigatum Zelt.

Collected on St. Paul Island.

Orthotrichum microblephare Schimp.

Collected on St. Paul Island.

Philonotis fontana Brid.

Collected on St. Paul Island.

Polytrichum alpinum Linn.

Collected on St. Paul Island.

Polytrichum strictum Banks.

Collected on St. Paul Island.

Racomitrium microcarpon Brid.

Collected on St. Paul Island.

Racomitrium lanuginosum Brid.

Collected on St. Paul Island.

Tetraplodon mnioides Br. & Sch.

Collected on St. Paul Island.

Webera cucullata Schimp.

Collected on St. Paul Island.

* **Webera canaliculata microcarpa** Kindberg.

* **Didymodon baden-powellii** Kindberg.

Sphagnum fimbriatum arcticum Jeus.

Sphagnum fimbriatum arcticum forma **fuscescens** Warnst.

Sphagnum lindbergii microphyllum forma **brachydasyclada**
Warnst.

Sphagnum riparium Angstr.

Sphagnum squarrosum imbricatum forma **brachyanoclada** Warnst.

Sphagnum squarrosum semisquarrosum Russ.

The following species of *Hepaticæ* were collected on St. Paul Island and determined by Prof. L. M. Underwood :

Diplophyllum taxifolium Nees.

Herberta adunca S. F. Gray.

Gymnomitrium coralloides Nees.